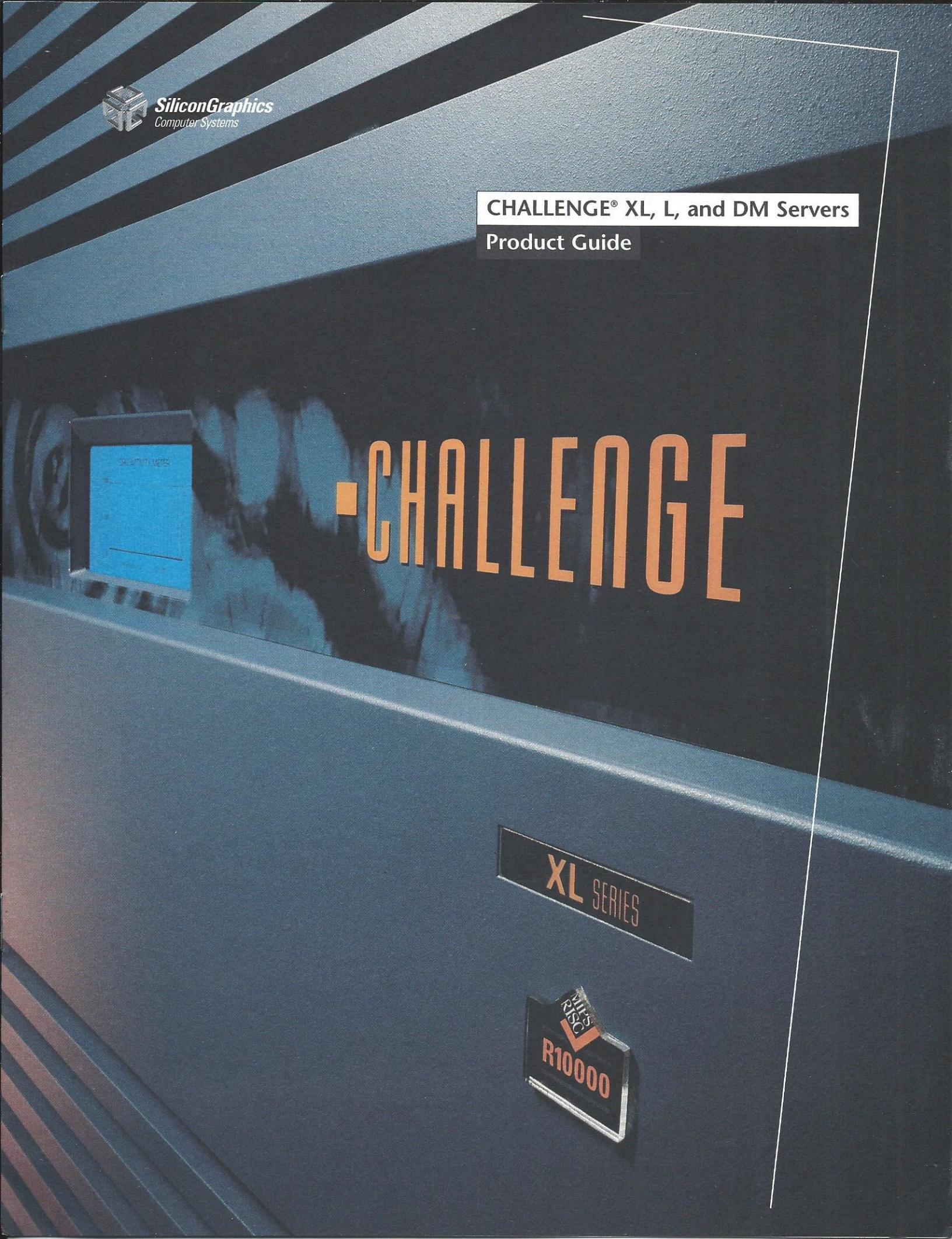

SiliconGraphics
Computer Systems
CHALLENGE® XL, L, and DM Servers
Product Guide
CHALLENGE
XL SERIES
MIPS RISC
R10000

As the world around us becomes more complex, so does the information we deal with. The world is rapidly moving from simple text-based information banks to ones that incorporate a wide variety of audio, video, and graphics data. This data is a challenge to manage—it's enormous and highly complex.

The key to managing complex data lies in finding a more efficient system for capturing, organizing, accessing, analyzing, and storing information. A system that's fast and economical. A reliable system that can handle large-scale processing and rapid access with no time delays.

CHALLENGE is that system.

CHALLENGE XL

Multiprocessing Muscle
Two to 36 MIPS® RISC R10000™ performance CPUs for peak integer performance

High-Capacity Memory
Memory expandable from 64MB to 16GB, with 1-, 2-, 4-, or 8-way interleaving

Powerful I/O System
Up to six POWER Channel™-2 boards provide up to 1.2GB/sec sustained I/O bandwidth

High-Bandwidth Bus
Up to 25 VME 64 bus slots provide sustained performance for connecting industry-standard controllers

SCSI-2 Fast/Wide Disk Technology
Up to 145.6GB internal disk storage, expandable to 5.6TB non-RAID and 17.4TB for RAID arrays

CHALLENGE L & DM

Affordable Multiprocessing
One to four MIPS RISC R4400® (CHALLENGE DM) or two to 12 MIPS RISC R10000 CPUs (CHALLENGE L) for balanced integer and floating-point performance

High-Capacity Memory
Memory expandable from 64MB to 6GB, with 1-, 2-, or 4-way interleaving

Powerful I/O System
Up to three POWER Channel-2 I/O boards provide up to 960MB/sec sustained I/O bandwidth

High-Bandwidth VME Bus
Five VME bus slots provide 50MB/sec sustained performance for connecting various industry-standard controllers

SCSI-2 Fast/Wide Disk Technology
63.7GB internal disk storage expandable to 3.7GB non-RAID and 10TB for RAID arrays

Premier Parallelism

The Silicon Graphics® family of CHALLENGE servers has a carefully balanced architecture for unprecedented power and performance. Parallelism is implemented at every level: CPU, memory, and I/O. This advanced design enables incredibly fast data throughput by splitting up instructions and eliminating bottlenecks at every subsystem level.

CHALLENGE L

This server is perfect for compute-intensive database and file serving applications, and media applications requiring rendering as well as stream management power. It can also handle large-scale database querying applications.

CHALLENGE XL

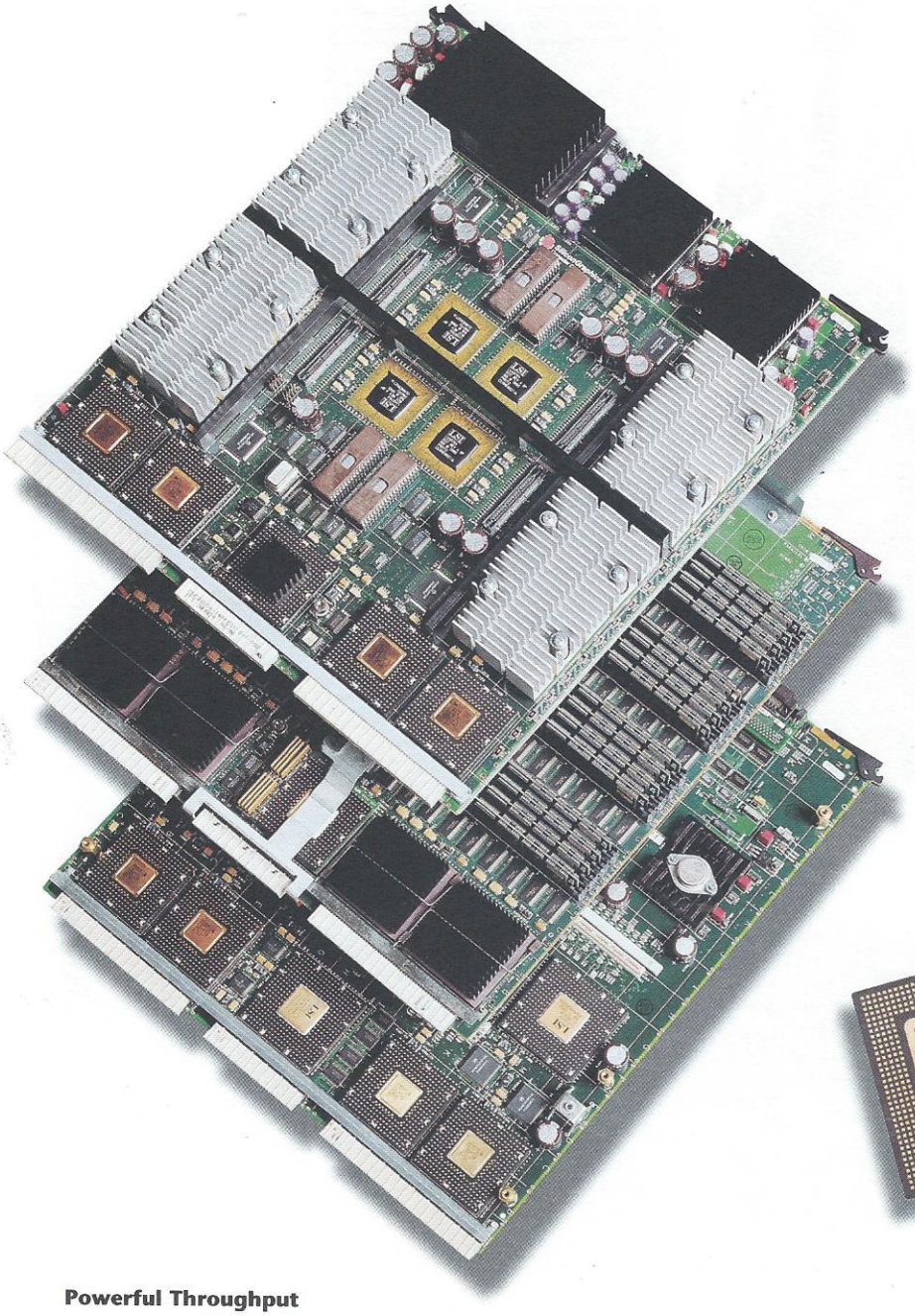
This ultimate server is ideal for large-scale, intensive database querying, and provides file serving support for rapid access to, and backup of, multiple terabytes of online and near-line storage. It supports hundreds of simultaneous digital media streams from a media library containing thousands of elements.

CHALLENGE DM

This entry-level server for symmetric multiprocessing is ideal for a broad range of database, World Wide Web serving, file serving, and real-time applications. For I/O-intensive applications, it provides unprecedented performance for its price.

The CHALLENGE family offers a choice of servers spanning every level of price/performance for any work group, department, or enterprise environment. The family begins with CHALLENGE DM, our most cost-effective symmetric multiprocessing system. For those requiring even more compute power, CHALLENGE L is the next step up the ladder. At the top, CHALLENGE XL offers the most expandable and powerful system for true mainframe-class performance and I/O expansion at a significantly lower price.

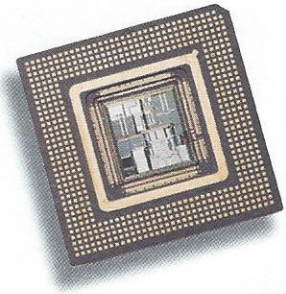
The CHALLENGE architecture is both scalable and fully expandable, and provides enormous storage capacity. CHALLENGE also excels in a variety of client/server environments due to superior networking and connectivity solutions. Silicon Graphics has a complete array of specialized software for managing the most complex information. And, of course, all Silicon Graphics systems are binary compatible.

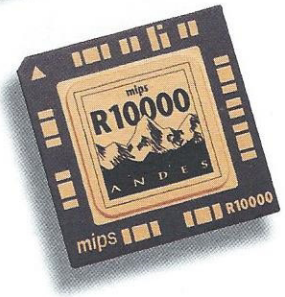


Processing Engine
- 2 or 4 R10000 CPUs per board (CHALLENGE L & XL)
- 1, 2, or 4 R4400 CPUs per board (CHALLENGE DM)
- 1 or 2MB secondary cache per CPU

High-Capacity Memory
- 1.2GB/sec sustained transfer rate
- Memory expandable from 64MB to 16GB with 1-, 2-, 4-, or 8-way interleaving

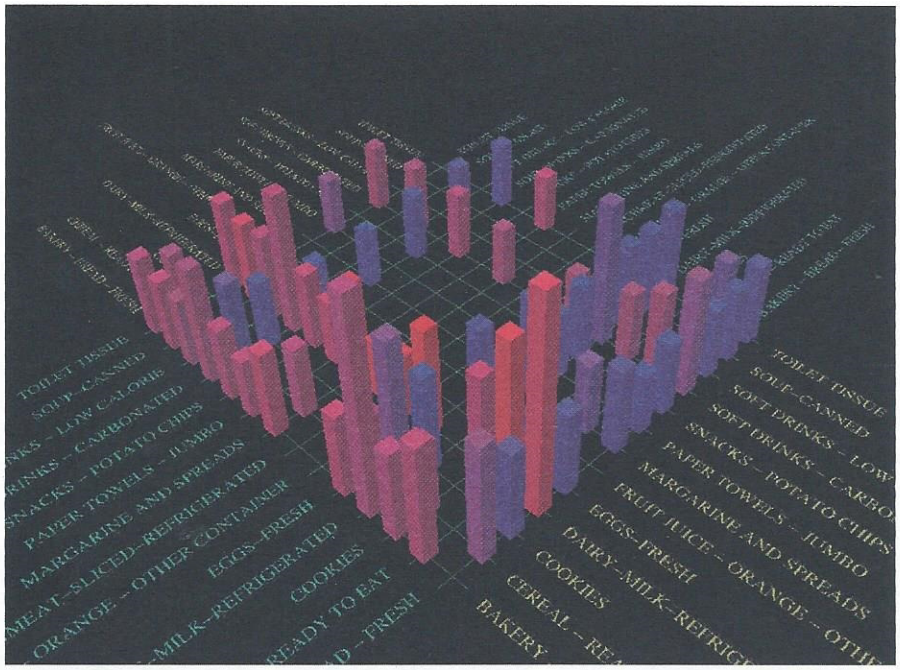
Flexible I/O
- Supports up to 19 Ethernet™ ports, up to 31 serial ports, a parallel port, up to 5 VME buses, and up to 42 Fast/Wide SCSI buses





MIPS R10000
The R10000 CPU features out-of-order execution and advanced branch prediction capabilities to address real-world application demands.

Powerful Throughput
The I/O subsystem is designed to efficiently move massive amounts of data. The POWER Channel architecture is the fundamental component of the I/O subsystem. Each POWER Channel-2 board boasts a sustained transfer rate of 320MB/sec per board and supports up to eight SCSI-2 Fast/Wide differential buses, as well as a 50MB/sec VME bus. CHALLENGE supports up to six POWER Channel-2 boards.



The highly scalable CHALLENGE architecture, coupled with the data visualization capabilities of Silicon Graphics products combine to provide real-time insight into otherwise inaccessible data.

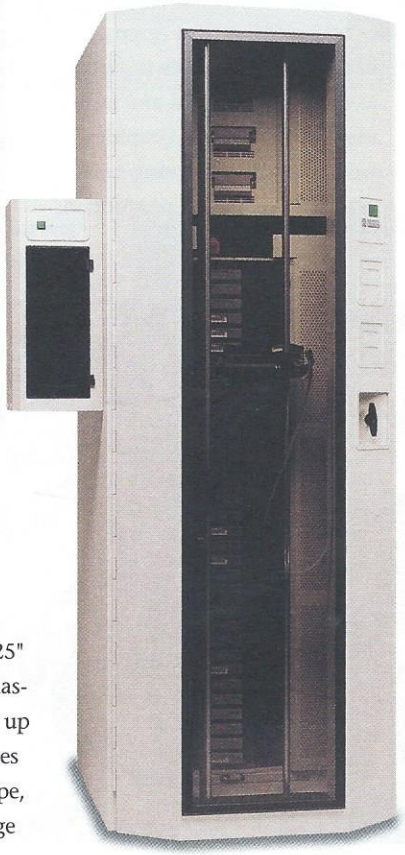
Visualization tools distinguish the CHALLENGE server family from its competitors. Graphical user interfaces facilitate the management of terabytes of disk and system-wide performance tuning. Innovative software also allows interactive visualization of the actual data stored on CHALLENGE, from real-time stock trades to interactive decision support.

CHALLENGE performs well in heterogeneous networked environments, allowing data sharing among many different system types. Ethernet, 100Base-T, FDDI, ATM, HIPPI, synchronous serial, Token Ring, X.25, IBM 3270™, and DECnet™ are all supported.

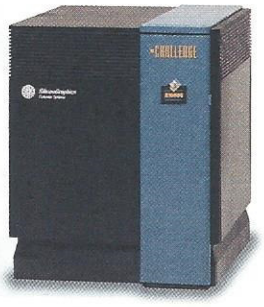
Comprehensive Storage Management

CHALLENGE efficiently manages enormous amounts of data. The POWERpath-2™ controllers connect and manage 5.6 terabytes of non-RAID and 17.4 terabytes of RAIDed disk storage. Efficient archiving and storage of this data is made possible by sophisticated backup and archival technology based on digital linear tape drives and stackers, as well as hierarchical storage management software.

For internal storage, two 20MB/sec SCSI-2 peripheral enclosures support either eight 3.5" drives or four 5.25" drives. The CHALLENGE Vault XL disk expansion chassis provides 12 SCSI peripheral enclosures supporting up to 96 3.5" drives. A variety of removable media devices are available, including CD-ROM, 4mm DAT, 8mm tape, DLT, and QIC-150 for software distribution interchange and backup requirements.



The CHALLENGE family supports terabytes of high-capacity, near-line tape storage via multiple tape libraries. Strategic partnerships with storage management vendors, such as EMASS and Legato, provide key storage features, including hierarchical storage management, tape and optical archiving, and high-speed heterogeneous backup and restore.



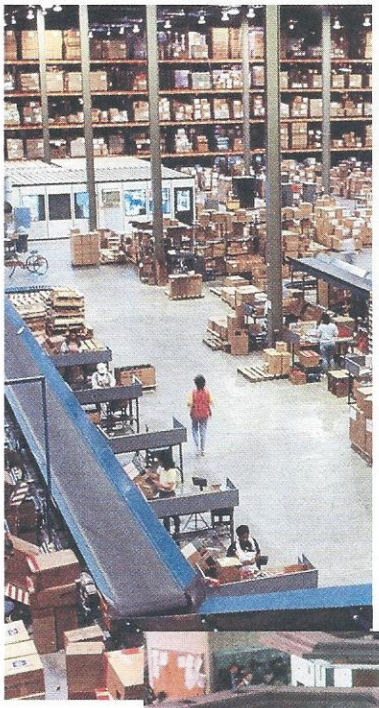
Innovative Markets

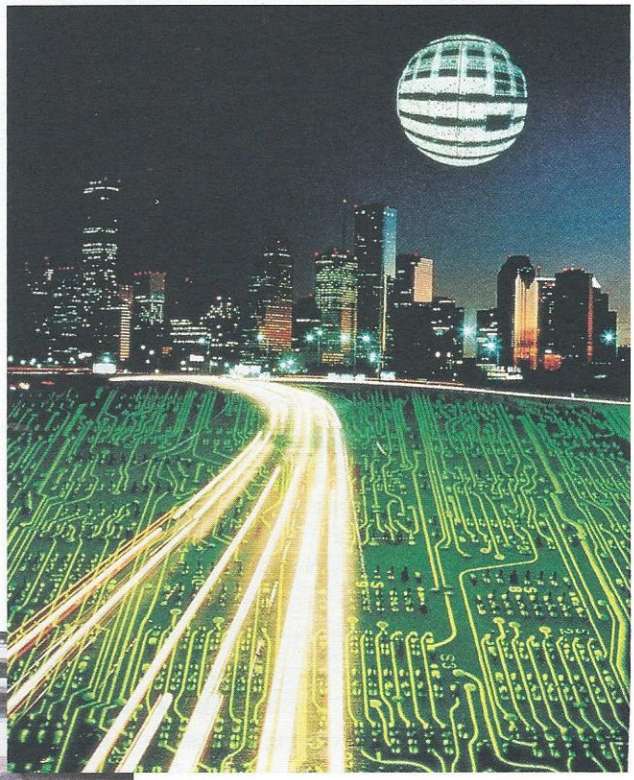
A variety of industries depend upon CHALLENGE for processing large bodies of information. CHALLENGE has become a necessity for many applications: file and media serving, enterprise and multimedia databases, database visualization, and intensive compute tasks.

Superior I/O performance and a 64-bit filesystem make CHALLENGE essential for large data set file serving. Industry-leading NFS™ performance coupled with a scalable SMP architecture allow CHALLENGE to serve a vast number of clients. Innovative high-availability load-balancing techniques allow enterprises to manage critical data. The CHALLENGE servers are ideal front ends for supercomputing applications that stream and analyze massive amounts of data. Combining these capabilities with deterministic I/O and process scheduling means that the unmodified CHALLENGE server can efficiently handle multiple interactive video streams.

CHALLENGE is used extensively in the broadcast/cable industry as the master control and traffic manager for Silicon Graphics workstations performing news edit plays, graphics, production, and cart replacement.

The unrivaled performance and storage capacity of CHALLENGE make it the best open systems solution for complex query-intensive database applications, such as data mining. Corporations use CHALLENGE for data mining to more effectively analyze and understand their marketing databases. Communications companies use CHALLENGE to better detect and prevent cellular fraud. Security agencies use CHALLENGE to manage fingerprint databases for suspect search and identification.





Software

Highly reliable methods of system management are essential for uninterrupted data flow in large networks. CHALLENGE servers support an array of specialized software for file, administration, connectivity, and storage management.

Filesystem management software delivers a quantum leap in filesystem recovery performance and assures data integrity. Customizable, easy-to-use system administration software allows managing and monitoring network status from a central location and reduces administration load. Premier network management software handles high-speed network traffic, reducing congestion and allowing more clients to participate on the same network. Storage management software flawlessly performs backup and archival tasks.

For more information on how CHALLENGE servers can help you manage new world data, call Silicon Graphics at 1(800) 800-7441 or contact your local sales office listed on the back of this brochure.

Silicon Graphics Performance Co-Pilot™ is a systems-level suite of tools that cooperate to deliver distributed, integrated performance management services, allowing the system administrator to quickly isolate and understand performance behavior, resource utilization and performance bottlenecks.

CHALLENGE Technical Specifications

CHALLENGE DM

Processor Data

Microprocessor	MIPS R4400 64-bit RISC CPU
Processors	1 to 4
Primary cache	16KB on-chip instruction cache 16KB on-chip data cache
Secondary cache	1 to 4MB secondary cache

System Bus

Bandwidth	1.2GB/sec sustained, parity protected
Size	256-bit wide data path, 40-bit wide physical address path

Memory Subsystem

Physical memory	64MB to 6GB ECC protected
Interleaving	1-, 2-, or 4-way

High-Speed I/O Subsystem

Bus type	SGI HIO bus (320MB/sec)
Bandwidth	160MB/sec per HIO slot
No. of HIO buses	1 to 3
No. of HIO slots	2 to 6

Industry-Standard I/O Subsystem

Bus type	VME-64 bus
Bandwidth	50MB/sec
No. of VME buses	1
No. of VME slots	5

Mass Storage

Interfaces	Up to 24 SCSI-2 channels
Protocols	SCSI-2, Fast and Wide single-ended or differential
Max. bandwidth	20MB/sec per channel
Device capacity	2GB, 4.3GB, or 9.1GB* formatted

External Storage

Vault L	72.8GB max per unit
Vault XL	873.6GB max per unit
Max. configuration	3.7TB max non-RAID 10TB max RAID

Removable Media

SCSI devices	CD-ROM, DAT, 8mm tape drive, 1/4" cartridge tape, DLT

Communications

Integrated serial I/O	Up to 4 serial ports @ 9600 baud Ethernet, SCSI-2
Integrated parallel I/O	Up to 3 parallel ports
VME controllers	Ethernet, FDDI, Token Ring, X.25, 100Base-T
SGI HIO controllers	Dual FDDI, HIPPI, SCSI-2, 8-port Ethernet, ATM

Dimensions and Weights

Base unit dimensions	Height: 25.25" Width: 20.5" Depth: 32"
Net weight	160 lbs (72.6 kg)
Vault L dimensions	Height: 27.75" Width: 7.5" Depth: 20.5"
Vault XL dimensions	Height: 62.3" Width: 27" Depth: 48"

CHALLENGE L

Processor Data

Microprocessor	MIPS R10000 64-bit RISC CPU
Processors	2 to 12
Primary cache	32KB on-chip instruction cache 32KB on-chip data cache
Secondary cache	1 or 2MB secondary cache

System Bus

Bandwidth	1.2GB/sec sustained, parity protected
Size	256-bit wide data path, 40-bit wide physical address path

Memory Subsystem

Physical memory	64MB to 6GB ECC protected
Interleaving	1-, 2-, or 4-way

High-Speed I/O Subsystem

Bus type	SGI HIO bus (320MB/sec)
Bandwidth	160MB/sec per HIO slot
No. of HIO buses	1 to 3
No. of HIO slots	2 to 6

Industry-Standard I/O Subsystem

Bus type	VME-64 bus
Bandwidth	50MB/sec
No. of VME buses	1
No. of VME slots	5

Mass Storage

Interfaces	Up to 24 SCSI-2 channels
Protocols	SCSI-2, Fast and Wide single-ended or differential
Max. bandwidth	20MB/sec per channel
Device capacity	2GB, 4.3GB, or 9.1GB* formatted

External Storage

Vault L	72.8GB max per unit
Vault XL	873.6GB max per unit
Max. configuration	3.7TB max non-RAID 10TB max RAID

Removable Media

SCSI devices	CD-ROM, DAT, 8mm tape drive, 1/4" cartridge tape, DLT

Communications

Integrated serial I/O	Up to 4 serial ports @ 9600 baud Ethernet, SCSI-2
Integrated parallel I/O	Up to 3 parallel ports
VME controllers	Ethernet, FDDI, Token Ring, X.25, 100Base-T
SGI HIO controllers	Dual FDDI, HIPPI, SCSI-2, 8-port Ethernet, ATM

Dimensions and Weights

Base unit dimensions	Height: 25.25" Width: 20.5" Depth: 32"
Net weight	160 lbs (72.6 kg)
Vault L dimensions	Height: 27.75" Width: 7.5" Depth: 20.5"
Vault XL dimensions	Height: 62.3" Width: 27" Depth: 48"

CHALLENGE XL

Processor Data

Microprocessor	MIPS R10000 64-bit RISC CPU
Processors	2 to 36
Primary cache	32KB on-chip instruction cache 32KB on-chip data cache
Secondary cache	1 or 2MB secondary cache

System Bus

Bandwidth	1.2GB/sec sustained, parity protected
Size	256-bit wide data path, 40-bit wide physical address path

Memory Subsystem

Physical memory	64MB to 16GB ECC protected
Interleaving	1-, 2-, 4-, or 8-way

High-Speed I/O Subsystem

Bus type	SGI HIO bus (320MB/sec)
Bandwidth	160MB/sec per HIO slot
No. of HIO buses	1 to 6
No. of HIO slots	2 to 12

Industry-Standard I/O Subsystem

Bus type	VME-64 bus
Bandwidth	50MB/sec per VME-64 bus
No. of VME buses	1 to 5
No. of VME slots	5 to 25

Mass Storage

Interfaces	Up to 42 SCSI-2 channels
Protocols	SCSI-2, Fast and Wide, single-ended or differential
Max. bandwidth	20MB/sec per channel
Device capacity	2GB, 4.3GB, or 9.1GB* formatted

External Storage

Vault XL	873.6GB max per unit
Max. configuration	5.6TB max non-RAID 17.4TB max RAID

Removable Media

SCSI devices	CD-ROM, DAT, 8mm tape drive, 1/4" cartridge tape, DLT

Communications

Integrated serial I/O	Up to 4 serial ports @ 9600 baud Ethernet™, SCSI-2
Integrated parallel I/O	Up to 4 parallel ports
VME controllers	Ethernet, FDDI, Token Ring, X.25, 100Base-T
SGI HIO controllers	Dual FDDI, HIPPI, SCSI-2, 8-port Ethernet, ATM

Dimensions and Weights

Base unit dimensions	Height: 62.3" Width: 27" Depth: 48"
Net weight	400 lbs (181 kg)
Vault XL dimensions	Height: 62.3" Width: 27" Depth: 48"

*Available mid-1996

SiliconGraphics
Computer Systems

For more information please call:

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